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C4I Joint Interoperability:  
Can We Achieve the JV2010 Vision?

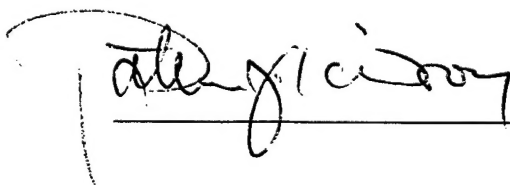
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In 2010, the joint force commander (JFC) will be unable to leverage the vision of *Full Spectrum Dominance* enabled by a *global* Command and Control, Communications, Computers and Intelligence (C4I) as predicted in Joint Vision 2010 (JV2010).<sup>1</sup> At the root of the problem is a complex array of obstacles and hurdles. JV2010's promise is *Full Spectrum Dominance*: a concept achieved at the joint task force (JTF) level only when each individual service component realizes the C4I potential of the operational concepts of dominant maneuver, precision engagement, full dimensional protection and focused logistics. According to JV2010, *Full Spectrum Dominance* "will be the key characteristic.... in the 21<sup>st</sup> century."<sup>2</sup>

*"By 2010, we should be able to change how we conduct the most intense joint operations. Instead of relying on massed forces and sequential operations, we will achieve massed effects in other ways. Improved command and control, based on fused, all-source, real-time intelligence will reduce the need to assemble maneuver formations days and hours in advance of attacks. .... The basis for this framework is found in the improved command, control, and intelligence which can be assured by information superiority."*

*--JV2010, p. 17-19.*

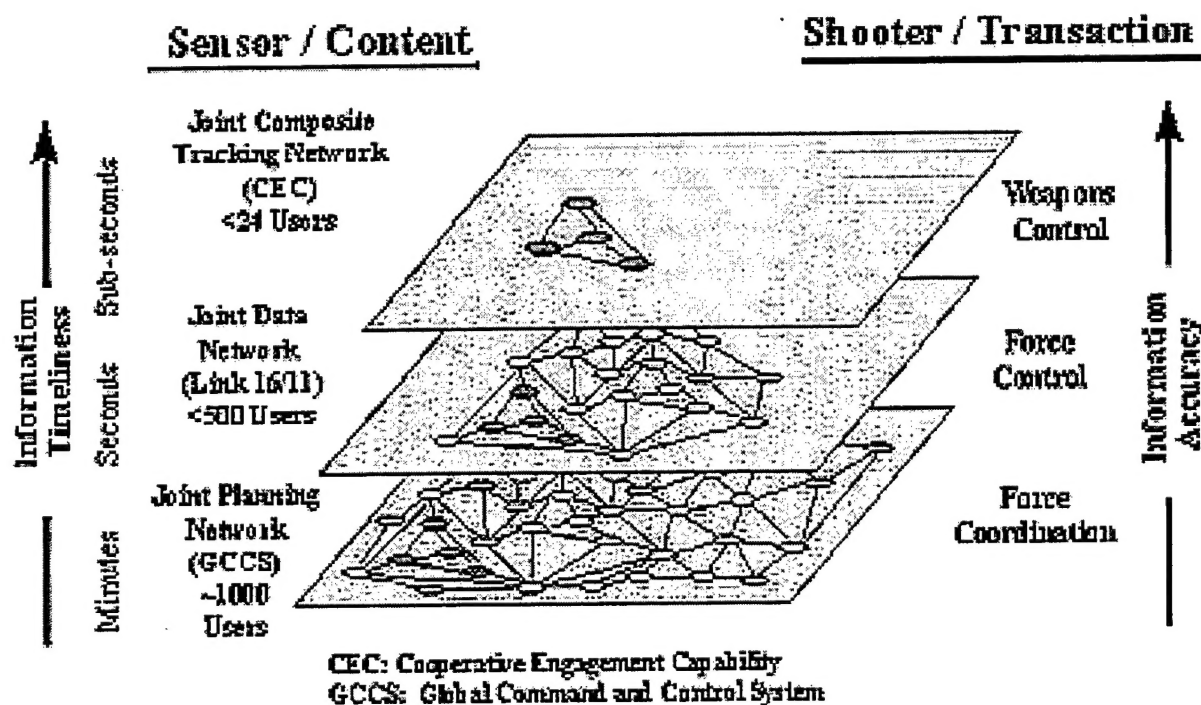
Today, each Service is developing C4I structures at different rates of change, with varying operational capabilities driven by Service Title X directives, regional CINC requirements, and subjective internal testing and validation standards and timelines. The purpose of this paper is to illustrate: first, the disjointed and asynchronous environment in which the respective services approach JV2010 C4I interoperability; second, that this concept is not on track to meet a 2010-ish timeline for operational employment; and lastly, to provide recommendations to aid strategies to affect this extraordinarily complex problem.

Though not addressed at length, the inclusion of allies/coalition partners in the operational fabric exacerbates the problem exponentially. Uniformly, our allies and coalition partners lack substantially in the development of interoperable, network-centric type systems.<sup>3</sup> It is also not within the scope of this paper to illustrate the difficult challenges of advancing JV2010 concepts through the acquisition process, defense budgetary cycles, reserve component

training and standardization, integration with governmental agencies, how to fix technology specific challenges, or overcoming the legalese of releasability criteria of classified information.

Joint Vision 2010 predicts information supremacy enabled by a Revolution in Military Affairs (RMA) in command and control technologies by the year 2010.<sup>4</sup> The 2010 joint force commander (today's commander/lieutenant colonel) has every right to question its validity. This paper recognizes that C4I systems enhancement portends the advent of *Full Spectrum Dominance*. In 2010, however, the likely result will be that the JFC will invariably tailor his C4I methods to the lowest common technology denominator and his command will substantially remain "platform centric" as we are today. Consequently, many of today's C4I methods will endure to 2010 and beyond.

An essential component to tapping the potential of JV2010 is applying Metcalfe's Law, which asserts that "the power of a network is proportional to the square of the number of nodes in the network."<sup>5</sup>



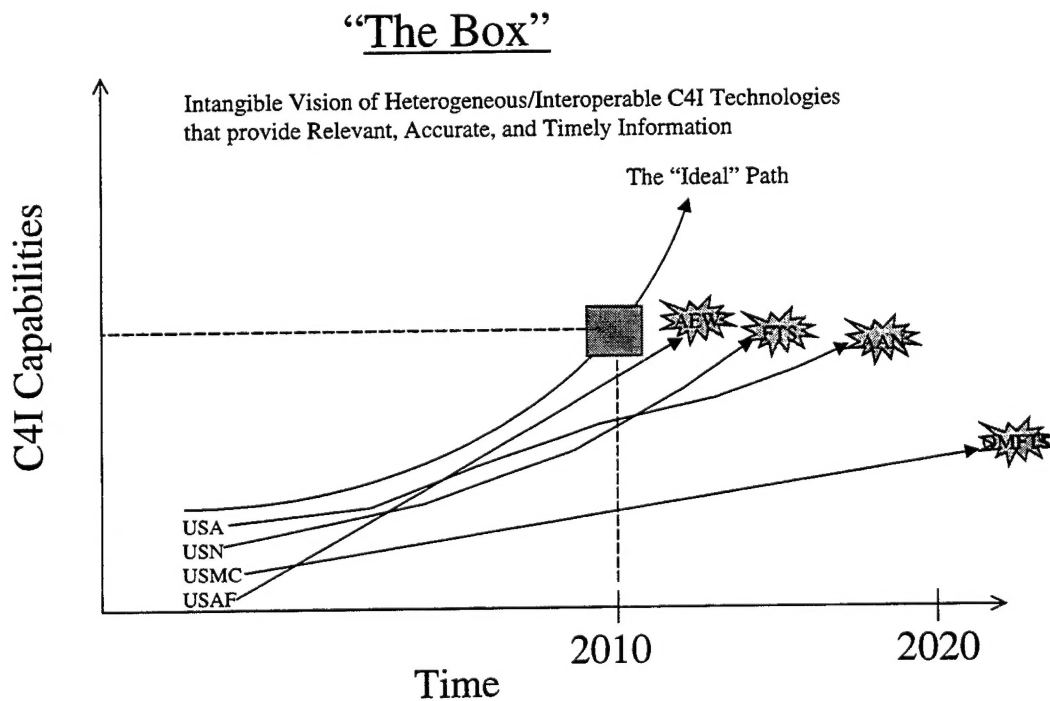
Given the sensor/shooter chart above, simultaneously linking 1524 nodes vertically and horizontally using like systems across three layers logically accelerates the common operational picture of the battlefield and subsequent decision-making ability. Overcoming the dissimilar and non-heterogeneous components that have come to characterize so many of the nodes is problematic, however, and naturally is an underlying goal of JV2010.

Several important DoD documents and directives propelling us towards the JV2010 path require a brief review. These *requirement directives* and *forcing documents* "guide" the Services towards realizing the warfighting potential of JV2010. "[I]t is DoD Policy that forces for joint and combined operations must be supported through compatible, interoperable, and integrated C3I systems that can support operations worldwide throughout the entire spectrum of conflict."<sup>6</sup> Promoting a global C4I infrastructure is the ultimate goal of JV2010 which includes a secure DoD-wide system accommodating the "widest possible range of missions and operational scenarios by allowing users to enter the infrastructure anytime and anyplace in the execution of any mission."<sup>7</sup> Currently, the overarching approach to JV2010 "implements revolutionary ideas in an evolutionary manner and allows the Chairman of the Joint Chiefs of Staff to guide the combatant commands, Military Departments, Defense agencies, and Joint Staff in a team approach where flexibility will absorb the dynamic changes the technology, economics, and politics will impose."<sup>8</sup>

On 1 OCT 99, Joint Forces Command (JFCOM) became DoD's Executive Agent for joint warfighting experimentation and is responsible to the CJCS for future CJCS joint warfighting concepts and integration of Service efforts in support of JV2010 and future CJCS joint warfighting visions. JFCOM will conduct joint experimentation to explore, demonstrate, and evaluate joint warfighting concepts. Experimentation will identify the breakthrough

warfighting capabilities necessary to achieve JV2010. Though responsible for integrating the efforts of the respective services, JFCOM lacks authority to fulfill its charter under the current DoD organization. The situation is lamented as follows: "managing [this] organizational change initiative is like trying to rebuild a large sea vessel while sailing it through unknown waters."<sup>9</sup>

What is the current reality of joint C4I interoperability? The Services are starting from culturally diverse reference points, moving at different rates of change along uncomplimentary paths towards ill-defined objectives. A comparative analysis of DoD joint interoperable systems compatibility potential versus the Army, Navy, Air Force and Marine Corps' conceptual timelines for joint interoperable C4I systems demonstrates troubling guidance gaps and desynchronized concept development towards establishing a universal, joint, and interoperable system. The following chart portrays the uncertain relationship between the JV2010 C4I and Service capabilities based on current conceptual projections.



We should expect our efforts are going to get us into "The Box." The reality of the current situation is that we do not know what JV2010 C4I capabilities should look like or how to achieve them: if we are going somewhere, we do not know where *there* is. In part, this is due to the current approach to defining the box. "The true capabilities and limitations of technologies are typically not known since they have not been fully tested and therefore have not been completely described. In fact, the effort required to elucidate this information in becoming increasingly onerous due to the breadth and complexity of technologies."<sup>10</sup> As stated in the Cebrowski/Gartska article, the power or pay-off of network-centric computing comes from information-intensive interactions between very large numbers of *heterogeneous* computational nodes in the network.<sup>11</sup> This is both the problem and the solution.

Thus by design, "The Box" is not defined. Unfortunately this has some very undesirable effects. According to a June 1999 J-6/Joint Staff assessment, "There isn't a single procedure in place to tell [a] DoD Component or DoD Component CIO (Chief Information Officer) how to implement Information Technology Management (ITM) policy." The same assessment goes further to critique the draft ITM policy in development as it "contains no procedures to prioritize system interoperability and make the problem more manageable.... Consequently, PM (Program Manager) does not have resources nor the obligation to find out which systems needs to be interfaced with his assigned program."<sup>12</sup> Today, this is a significantly important assessment as the Director, J6 has the responsibility for *Interoperability Certification*, including conformance with joint C4I policy and doctrine, technical architectural integrity and interoperability standards.<sup>13</sup> The Commander, JFCOM, ADM Harold W. Gehman, stated the same concerns during a recent interview with Armed Forces International Journal:

If you ask, 'Is there any requirement in today's command and control systems for all the services to have a common view of the battlefield?', the answer is that there is not. [Today] each service builds its own system optimized to meet its own requirements, and then we make it interoperable

afterwards when it gets in the field. We are never going to be able to do the kind of operations we envision in 2010 if we don't have at least a common view of the Blue side of the battlefield, and we are currently building systems today that will not allow us to do that. And that [deficiency] limits our joint capabilities today, too." AFI Journal Int'l, Dec '99, p. 32.

Title 10, USC, sections 3013, 5013, and 8013 requires the respective Services to organize, supply, equip, conduct research and development, and train their forces in order to meet the current and future operational requirements of the unified commands.<sup>14</sup> Military professionals know that modernization programs are characterized by incremental improvements to systems infrastructure to enhance C2 capability and are budget limited. In today's joint force, the Service Chiefs and their Staffs are the *force providers* and *resourcing headquarters* to the geographic and functional CINCs. Consequently, because of the Service's Title 10 requirements, "today's military culture favors military service requirements more than it does those of the [JFC]."<sup>15</sup> In the current DoD organization, Service timelines, funds and Title X interests are "priority one." Consider the following:

- a. "We may be desynchronized from the desired path to JV2010 but we have our Title 10 requirements." Senior Officer, Marine Corps Combat Development Command.
- b. "We know where we're going in the next 4 years, inside the POM. Whether or not we ever achieve the Army After Next (AAN) remains to be seen." Senior Army Officer Representing the Army Digitization Office. Department of the Army.
- c. Ours is a Navy-centric strategy. "It is the Navy's vision that we will win the nation's future wars." Senior Member, Naval Strategy and Research Department, U.S. Navy War College.

Closer to the operational level, the geographic CINCs find themselves in somewhat of a "Catch 22" between fulfilling their warfighting responsibilities and assisting the Chairman and Service Chiefs in advancing the potential of JV2010 C4I (et al). Each day, these *warfighters*



confront a unique set of considerations and threat arrays as well as face the front lines between legacy C4I systems and state of the art military technology. Over the years, a varied array of capabilities and requirements developed into an eclectic assortment of theater-specific systems. It is no secret that each of the CINC-doms established Non-DoD standardized systems (non-*global* in DoD terminology) to address the specific needs of their AOR. Because the characteristics of these systems are typically "closed-loop" and lack interoperability, the CINC's IPL lists uniformly highlight the lack of joint C4I stating substantial incompatibilities, budget shortages, and standardization problems.<sup>16</sup>

For example, in Combined Joint Forces Korea (CJFK) the U.S. Air Force and the Army conduct offensive deep operations planning using a hybrid version of the Automated Deep Operations Planning System (ADOCS) to plan, command and control Army attack helicopters and Air Force fixed wing sorties. The system has the ability to translate into Hangul and English, as the South Korean armed forces are integrated users. Information traffic is passed mainly through a hard-wired, fiber optic backbone. Notably, the rotating fleets of the U.S. naval forces offshore do not have ADOCS access. Though III Corps, the reinforcing CONUS force, is conceptually integrated into the theater C2 architecture the commands and staffs do not routinely train with compatible ADOCS hardware and software. HQDA does not endorse ADOCS as it competes with other U.S. Army programs such as FATDS and TAIS that are designed to perform similar tasks and are conceptually integrated into the Army's Tactical Command and Control System (ATTCS).<sup>17</sup>

To fix the joint interoperability challenges of JV2010, JFCOM was tasked to conduct joint warfighting experimentation and made responsible for "training and integrating multi-service combat forces based in the continental US (CONUS) to conduct effective joint operations

overseas."<sup>18</sup> To date, the JFCOM response to the challenge has been a litany of white papers and concept documents addressing a 1998 list of 21 *Desired Operational Capabilities* (DOCs) provided by the Joint Staff "in conjunction with the CINCs, Services and DoD agencies" with only a select few, including joint *command and control* identified as high priority challenges.<sup>19</sup> Additionally, CINCJFCOM issued Campaign Plan '00 to illustrate his vision of implementing his charter. Insightful to the JFCOM approach is the promise to conduct a major integrating experiment (MJIE) during FY 2004.<sup>20</sup> JFCOM is tagged with a "tar baby" of monumental proportion. As the merge of technology and concept has yet to be defined, CINCJFCOM finds himself in a quandary, also. First, he is not fully empowered with authority to task the geographic CINCs to conduct testing and evaluation commensurate with his responsibility. Second, his success requires the geographic CINCs and Service Chiefs to support his initiatives with troops and equipment in the midst of executing their own regional go-to-war readiness requirements and training timelines.<sup>21</sup> Third, though the Service Chiefs develop, acquire, field, and train their component forces, there are oftentimes alarming inter-theater disparities. The interoperability of a particular force is sometimes a function of basing and service influence. CINCs have come to realize that the equipment, procedures, and security requirements differ between the Navy's U.S. Atlantic and Pacific Commands and present challenges for commanders and units being assigned from one theater to another.<sup>22</sup>

It is no small wonder, then, DoD's solution is an adaptive evolution process. According to Chairman, JCS Instruction, CJCSI 6212.01A, "[T]his approach implements revolutionary ideas in an evolutionary manner."<sup>23</sup> Currently, JFCOM is developing an experimentation schedule to test the Services capabilities to interoperate in selective DOCs—the first major test is scheduled for FY04. Of the 21 DOCs the Joint Staff identified, only six are listed for conceptual

and modeling testing in the most recent draft of the Adaptive Joint Command and Control White Paper.<sup>24</sup> In it, the document underscores the immature development of fused joint C4I.

In part, the explanation of the current dilemma is technological, covering a broad range of factors (systems incompatibility, bandwidth limitations, limited space vehicle coverage, etc); but part of the problem is scientific. Within the last 10 years a new scientific field called “Complexity Engineering” has emerged to address the type of chaos management JV2010 C4I envisions. Consequently, the scientific modeling and development of complex adaptive systems, like the U.S. Armed Forces, has motivated the Navy to establish the Newport Complexity Working Group at the Naval War College to study its problematic nature.<sup>25</sup>

Meanwhile, throughout the JFCOM Campaign Plan and Adaptive Joint Command and Control Concept and other White Papers is an unquestionable monotone: “We are preparing to experiment.” Fully recognizing the complexity and chaotic nature of the task before them, leadership at Norfolk has firmly embraced DoD's authorization to adapt progressively. In the current arrangement, theirs will be a plan certain to be limited by politics, unpredictable world crises, high OPTEMPO of limited forces, budgetary cycles (POM, PPBS, etc.) and the cumbersome process of changing a complex organization like DoD. According to Dr. Geoffrey P. Malafsky, who recently authored a study for the Navy entitled Streamlining the Transition of Emerging Technologies Into Navy C4ISR, there are several by-products to our current approach that we must be prepared to accept:

- a. Guaranteed to be expensive. Just like renovating an old Victorian era house with antiquated heating, plumbing and electrical circuitry, it's far easier and less expensive to rip down the old structure and begin anew with modern facilities. However, most homeowners refuse to do that in order to protect the structure he's likely built and grown to love. This will

surely be the case in an organization as immense and complex as the Department of Defense.

Additional costs accrue through trial and error. Example: the Army is likely to scrap its "Landwarrior" program as "unsuitable" having already spent \$2.1 billion.<sup>26</sup>

b. Guaranteed to take a long time. JFCOM plan is based on "Discovery Learning" that's driven by experimentation scheduling and the availability of forces and equipment to produce the scientific data. Current fielding schedules have been changed so often that each timeline document has a "truth date time group." As the potential of JV2010 C4I is wed to technology whose capabilities are doubling on average of every 18 months, we can expect more of the same.

c. Guaranteed to be susceptible to significant friction in the event of world/regional crises that occur at the rate of several per year. Example: U.S. Army contingency deployment of 10<sup>th</sup> Mountain Division to Bosnia-Herzegovina to participate in Stabilization Force (SFOR) has stalled the testing, training, and fielding of *Light Contingency Force* development of the Army's Experimentation Campaign Plan.<sup>27</sup>

*If Microsoft and AOL can get the world on the same common networked operating system, then why can't DoD?*

### **Conclusions.**

Military operations are typically joint and it is therefore essential that the Services C4I systems work together effectively. Yet, recent events have proven interoperability's elusiveness. After serving as the Military Assistant to Ambassador Oakley during Operation Restore Hope in Somalia, GEN Anthony Zinni described the difficulties of coordinating the details of an important, though routine, meeting between himself and GEN Aidid with his subordinate commanders. Rather than being able to make one conference phone call, VTC or FM/VHF radio broadcast to his supporting joint and coalition headquarters, GEN Zinni had to visit each subordinate personally to ensure himself of "mission receipt."<sup>28</sup>

Today, relative to other nation states, the U.S. is information dominant by any measure. It is clear, however, that we will not achieve the potential of *Full Spectrum Dominance* by the year 2010 as predicted in JV2010. Presently, the Services are advancing to the vision of JV2010 along paths that first and foremost meet their Title 10 requirements. Though *conceptually* these paths are mutually supporting, in practice the merging of these paths is unrealized. There is no objective standard that exists today to ensure that we can achieve the desired result. In the meantime, ours will continue to be an adaptive process, as we understand and develop the potential of JV2010 and Network-centric warfare at the operational/joint force level. In short, the path ahead will remain uncertain until we know how to exploit the information technology and annunciate these capabilities into objective measures of C4I performance.

Collaborative and complimentary Service concepts, doctrine and C4I programs are both solution and problem. Military technology today requires incredible scientific creativity to enable its application, making JV2010 less art than science. For many reasons, only a few of

which are mentioned herein, JV2010, AAN, OMFTS, FTS, and EAF have yet to prove themselves relevant, accurate and timely.<sup>29</sup> Each has yet to be validated independently and collectively as interoperable. It will be no small matter to overcome the organizational inertia and Service cultures of the Department of Defense. Another contemporary problem is the "if it ain't broke, don't fix it" mentality. "Current arguments for Network-centric warfare [et al] are driven in large measure by opportunity rather than need, and are likely to prove unpersuasive to the majority who find the status quo not only acceptable, but comforting. During Global '99, warfighters found it difficult, or were unable, to embrace new and different concepts of force employment. [Commanders] naturally gravitated toward old organizational structures and relationships. The value of change just wasn't evident."<sup>30</sup>

DoD's cumbersome structure is part of the larger problem. Today's CINCs and JTF Commanders cannot fix the C4I challenges and problems of the future *global* joint force. That is the job of the DoD, the respective Service Chiefs, their staffs and the Joint Staff. Consequently, Commanders in the field will continue to conduct business as they know how using proven, reliable systems. To paraphrase a senior USMC General when asked during a recent visit to the Naval War College about the applicability of future C4I technologies, "If senior warfighters can't convince themselves of system reliability, then they won't use it."<sup>31</sup> Of particular concern to senior officers and DoD officials should be the initiation of new Congressional statutes, possibly a revision of, or addendum to, the Goldwater-Nichols Act, directing joint interoperability, unless DoD fixes the current state of affairs.

In the near future, it is unlikely that U.S. Reserve forces, as well as our Alliance and Coalition partners will have compatible, interoperable C4I systems with those of the active forces. Consequently, we will invariably be required to provide equipment, operators,

technicians, and logistical support enabling their C4I capabilities. Of particular concern at the Operational level and below is the likelihood this will be an *unresourced* force requirement of low density, high demand military occupational specialists that will come "out of hide"--at the expense of their owning commands.

Finally, we anticipate that future conflicts will be "come as you are." Our equipment has to work as advertised! With a renewed emphasis on force projection operations (FPO), and the concept of early entry halt to an invasion, it means that there will be less time during deployments to fix interoperability problems in critical command and control areas. Joint missions conducted during FPO such as close air support, suppression of enemy air defenses (SEAD), Theater Missile Defense (TMD) and deep strike attack require the best equipment and systems we can afford to provide to our warfighting organizations.<sup>32</sup>

*Achieving the full promise of this vision will largely depend on how well we structure our defense program. We will have to make hard choices to achieve the tradeoffs that will bring the best balance, most capability, and greatest interoperability for the least cost...between now and the year 2010." --- JV 2010 (p. 32-33).*

### **Recommendations:**

Achieving the potential of JV2010 C4I and all of its supporting concepts implies changing human and organizational behavior.<sup>33</sup> Toward any adjustment we make designed to overcome the challenges of Service-centric Title X budget cycles we must constantly measure our successes and failures against the operational level *warfighter's* go-to-war criteria of relevance, accuracy and timeliness. The following recommendations should be considered collectively, as they are not listed in any hierarchical order and reflect that construct.

A JTF Commander's battlespace extends from the heights of space to the depths of the sea and include all points in between within his AOR. In the interim of establishing a *global* C4I, the DoD, JCS and Services should focus on the joint/coalition force C4I requirements of the regional CINCs. Efforts should include, but are not limited to, enhancing their interoperable C4I readiness, supporting their established programs, and continuing to apply adaptive processes towards achieving global C4I interoperability. Focus these efforts on most likely major theaters of war such as Korea and Southwest Asia. Consider and address regional requirements, policies as they apply to both coalitions and alliances. Integrate this regional approach into programmed testing and evaluation coordinated by JFCOM. The geographic CINCs and their staffs must continue integrating themselves into the Requirements Review process as specified in multiple CJCSIs; develop interoperable C4I validation timelines and articulate specific requirements to Services and JCS. CINCs must do more than annually updating their IPL's. This must be an interactive process.

DoD must demand that the Services cross-coordinate/validate systems as interoperable. Organize and actively engage a technical branch of the Government Accounting Office and/or



Inspector General to assess the effectiveness of DoD policies and instructions, ensure compliance and report directly the Chairman, JCS and SECDEF on a biennial basis. DoD/ Vice Chief, JROC and JCS staff must continue to direct/monitor program.

ADM Gehman stated that JFCOM's new name "primarily reflects our move toward more *functional* responsibilities and away from being a typical geographic command."<sup>34</sup> In this light, recommend that DoD assign JFCOM within the Joint Strategic Capabilities Planning (JSCP) directive with a Functional Plan requirement as a *supported headquarters* to synchronize the collaborative effort recognizing specific requirements of geographic CINCs. This will provide legitimacy to JFCOM's efforts and provide clear guidance to CINCs as enablers. Ensure Services provide resources and set conditions for success. JFCOM, for their part, must maximize the value of the Joint Operational Architecture Working Group (per CJCSI 3170.01A) and continue the development of Joint Operational Architecture (JOA) with the endstate of JFCs and their forces achieving interoperable C4I. DoD must ensure JFCOM is resourced with the best and brightest personnel available, including appropriate funding authorization for research and evaluation, as well as providing JFCOM the autonomy to help solve DoD's problem. Once assigned, JFCOM must execute the JSCP Functional Plan as directed by CJCS. Recommend the specific tasking of integration and validation of AJC2 capabilities during major joint force pre-deployment training exercises and prior to operational deployment. Furthermore, recommend CINCs include joint interoperability readiness and training in their Theater Engagement Plans (TEPs) and exercises.

The Joint Staff must provide assistance to the CINC's in developing mission needs and coordinating requirements through Joint Warfighting Capabilities Assessment teams and Joint Staff functional area experts to assist during the definition and documentation phases of Mission

Needs Statement (MNS) development. The Joint Staff must assist in the development of a JSCP Functional Plan for coordination and execution by JFCOM with the geographic CINCs that focuses on developing and validating the Desired Operational Capabilities identified by experimentation, testing and validation via JFCOM joint exercises.

The Services must meanwhile study and initiate cultural changes to their respective doctrine and training that focus upon the technical complexity of the future command and control procedures within the joint force.

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- <sup>1</sup> Joint Vision 2010, Washington D.C. 1996, p. 19
- <sup>2</sup> Joint Vision 2010, p. 2.
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